

"The Body Seems to Defy Physical Laws"

permit the *experienced* forensic pathologist to be reasonably accurate in his calculations. Regardless of the number or position of the bullet wounds in the body in a given case, the first step is to determine whether each wound is a wound of entrance or a wound of exit.

When a bullet strikes the skin, it first produces a simple indentation, because the skin is both tough and elastic, and the tissues underneath are not rigid and resistant. This stretches the skin immediately under the nose of the bullet. The bullet, which is rotating as well as moving forward, is definitely slowed up at the point of first contact, but it then more or less bores its way through the skin and the tissues underneath, and courses on into the body. The skin is stretched by the bullet at the point at which it passes through; it then returns to its former condition, so that the size of the wound of entrance appears to be smaller than the diameter of the bullet which made it. Usually, there is only a small amount of bleeding from wounds of entrance, since tissue destruction at this point is not great. These rules apply to bullet wounds that are the result of the gun being fired at distances in excess of fifteen to eighteen inches. A different set of rules applies when the gun is held in direct contact with the skin or is fired from a distance less than fifteen to eighteen inches.

Wounds of exit, on the other hand, are usually larger than the bullet, since the bullet tends to pack tissues in front of it. These wounds are ragged, torn, and sometimes have shreds of fat or other internal tissues extruding out of them. As a result, wounds of exit may bleed far more extensively than wounds of entrance. This, however, is not invariably the case.

"You always are guided by the general rules that apply to bullet wounds," Dr. Helpern says, "but you must also be on guard for the bizarre, the unusual, the once-in-a-million case, the wounds that to the novice seem to defy physical laws. It is not a job for the beginner or the man whose knowledge is limited to a lecture or two, or to what he has read in some article or textbook."

To fully appreciate the gravity of Dr. Helpern's observations on the medical facets of President Kennedy's death, it is necessary to go back to the historic day of Friday, November 22, 1963.

Sometime between 12:30 P.M., when the tragedy struck in

to the Naval Medical Center, I was called to the Center by my superiors and informed that the President's body would be brought to our laboratories for an examination, and I was charged with the responsibility of conducting and supervising this examination; told to also call upon anyone whom I wished as an assistant in this matter, that I deemed necessary to be present.

MR. SPECTER. Who did assist you, if anyone, in the course of the autopsy?

COMMANDER HUMES. My first assistant was Commander J. Thornton Boswell, whose position is Chief of Pathology at the Naval Medical School, and my other assistant was Lt. Col. Pierre Finck, who is in the Wound Ballistics Section of the Armed Forces Institute of Pathology.

In short, Commander Humes was a "hospital" pathologist. By any charity of imagination, he could not be considered a "forensic" pathologist or a "medico-legal" pathologist. The distinction between the two types of pathology is basic to a proper evaluation of the Warren Commission Report.

Pathology is the branch of medicine which concerns itself with the nature of disease, the causes of disease, its process of development, and its effects on the tissues and organs of the body. As Commander Humes indicated, the broad field of pathology breaks itself down into sub-fields and sub-specialties. One of these is forensic pathology. "Forensic" in this sense implies anything that has to do with the courtroom or some step in the administration of justice. The term "medico-legal" has the same meaning.

The "hospital" pathologist performs his autopsies on cases where death occurs in a hospital, usually as a result of some natural disease process. The cause of death is *presumed* in the great majority of cases because the patient has been under medical treatment. The autopsy is performed to confirm the diagnosis, or for research or other academic purposes.

The "forensic" or "medico-legal" autopsy has an entirely different setting. The death is usually not attended by a physician. The exact cause of death is crucial because of the legal implications. There may or may not be a suggestive or presumptive lead to guide the autopsy surgeon. If there is a lead, it is frequently insidious and misleading. The hospital patholo-

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gist is as much out of his field when he attempts a medico-legal autopsy as is the chest surgeon who attempts a delicate brain operation.

This analogy must be given a practical qualification. The chest surgeon would not attempt a delicate excursion into a living patient's brain for fear of killing him. Unfortunately, hospital pathologists are not fettered by any such fears.

Assistant Commission Counsel Specter did not consider it either necessary or advisable to attempt to establish Commander Boswell's expertise in the field of forensic pathology, or to ascertain whether he had any experience with bullet wounds in the body. The answer is that he had absolutely none worthy of mention.

Colonel Finck's professional qualifications were presented in an interesting fashion to the Warren Commission.

MR. SPECTER. What is your profession, sir?

COLONEL FINCK. I am a physician.

MR. SPECTER. And by whom are you employed?

COLONEL FINCK. By the United States Army.

MR. SPECTER. And what is your rank?

COLONEL FINCK. I am a Lieutenant Colonel in the Medical Corps.

MR. SPECTER. Where did you obtain your medical degree?

COLONEL FINCK. At the University of Geneva Medical School in Switzerland.

MR. SPECTER. And in what year did you obtain that degree?

COLONEL FINCK. In 1948.

MR. SPECTER. What has your experience been in the medical profession subsequent to obtaining that degree?

COLONEL FINCK. I had 4 years of training in pathology after my internship, 2 years, including 2 years of pathology at the University Institute of Pathology in Geneva, Switzerland, and 2 years at the University of Tennessee Institute of Pathology in Memphis, Tenn.

MR. SPECTER. And how long have you been in the United States Army?

COLONEL FINCK. Since 1955.

MR. SPECTER. And what have your duties consisted of in the Army?

COLONEL FINCK. From 1955 to 1958 I performed approx-

imately two hundred autopsies, many of them pertaining to trauma including missile wounds, stationed at Frankfurt, Germany, as pathologist of the United States Army Hospital in Frankfurt, Germany.

MR. SPECTER. Have you had any additional, special training or experience in missile wounds?

COLONEL FINCK. For the past 3 years I was Chief of the Wound Ballistics Pathology branch of the Armed Forces Institute of Pathology and in that capacity I reviewed personally all of the cases forwarded to us by the Armed Forces, and some civilian cases from the United States and our forces overseas. The number of these cases amounts to approximately 400 cases. I was called as a consultant in the field of missile wounds for this particular case, and also last year in February 1963, the Surgeon General of the Army sent me to Vietnam for a wound ballistics mission. I had to testify in a murder trial, involving a 30/30 rifle in the first week of March of this year, and I came back yesterday after one week in Panama where I had to testify. I was sent to Panama by the Secretary of the Army regarding the fatalities of the events of 9-10 in January of 1964.

MR. SPECTER. Have you been certified by the American Board of Pathology, Doctor Finck?

COLONEL FINCK. I was certified in pathology anatomy by the American Board of Pathology in 1956, and by the same American Board of Pathology in the field of forensic pathology in 1961.

Of the two hundred autopsies he performed in Frankfurt, Germany, Colonel Finck did not give the number that involved bullet wounds in the body. He used the vague term "many." As to the four hundred cases that had come to his attention during his tenure as Chief of the Wound Ballistics Pathology branch of the Armed Forces Institute of Pathology, he says, "I reviewed personally." Colonel Finck's four hundred "reviewed" cases clearly are not four hundred cases in which he presided at the autopsy table and attempted a personal determination as to whether a bullet wound in the body is a wound of entrance or a wound of exit. His duties at the Armed Forces Institute of Pathology were administrative and supervisory. They did not include the performance of autopsies. He mentioned specifically

only two bullet wound cases in which he had personally testified.

These were the three men charged with the responsibility of evaluating President Kennedy's gunshot wounds. They were all officers and gentlemen, and accomplished in their respective fields of general pathology. Regrettably, their field was not bullet wounds in the body. This particular autopsy was forced on them by circumstances over which they had no control. They dared not refuse it.

As a matter of fact, Colonel Finck's summons to Bethesda was something of an afterthought. He arrived well after the autopsy had begun and after a fragment of bullet had been removed from the President's head. He would not have been there at all except that General Blumberg, the commanding officer of the Armed Forces Institute of Pathology, telephoned Commander Humes to offer Colonel Finck's services. Colonel Finck was relegated to a back-row position.

The natural discomfort of the three autopsy surgeons who were working in an area in which they were basically unfamiliar—personally evaluating bullet wounds in the body at the autopsy table—was intensified by the goldfish-bowl atmosphere that enveloped their historic operations. The arena was jammed with FBI and Secret Service agents and various other persons. Commander Humes describes it:

MR. SPECTER. Tell us who else in a general way was present at the time the autopsy was conducted in addition to you three doctors, please?

COMMANDER HUMES. This, I must preface by saying it will be somewhat incomplete. My particular interest was on the examination of the President and not the security measures of the other people who were present.

However, the Surgeon General of the Navy was present at one time or another. Admiral Galloway, the Commanding Officer of the National Navy Medical Center; my own Commanding Officer, Captain John Stover of the Naval Medical School; Dr. John Ebersole, one of the radiologists assigned to the Naval Hospital, Bethesda, who assisted with the X-ray examinations which were made. These are the chief names, sir; that I can recall.

MR. SPECTER. What time did the autopsy start approximately?

COMMANDER HUMES. The President's body was received

at 25 minutes before 8, and the autopsy began at approximately 8 P.M. on that evening. You must include the fact that certain X-rays and other examinations were made before the actual beginning of the routine type autopsy examination.

MR. SPECTER. Precisely what X-rays or photographs were taken before the dissection started?

COMMANDER HUMES. Some of these X-rays were taken before and some during the examination which also maintains for the photographs, which were made as the need became apparent to make such.

However, before the postmortem examination was begun, anterior, posterior and lateral X-rays of the head, and of the torso were made, and identification type photographs, I recall having been made of the full face of the late President. A photograph showing the massive head wound with the large defect that was associated with it. To my recollection all of these were made before the proceedings began.

Several others, approximately 15 to 20 in number, were made in total before we finished the proceedings.

The taking of X-rays was a promising beginning and should be done in any gunshot or bullet wound case. The wanderings of bullets inside the human body both before and after death are often so bizarre that the only practical way to locate them is through the use of diagnostic X-rays. One case from Dr. Helpert's vast personal experience is sufficient to illustrate the need for X-rays. A .38 caliber lead bullet entered a man's right subclavian vein, a major vein just under the collarbone. It somehow made its way down through the right auricle, the right lower chamber of the heart, through the inferior vena cava, one of the two principal veins that return the blood from the body to the heart, finally to come to rest in the common iliac vein down in the region of the right hip. Without X-rays, the bullet would probably never have been found.

The autopsy on the President's body continued until 11 P.M., when it was released to those who would prepare it for burial and take it to the White House, where it arrived at four o'clock Saturday morning, November 23.

The weeks following the President's death flowed into months as the FBI and Secret Service painstakingly and thoroughly as-

sembled the evidence, item by item, for formal presentation to the Warren Commission. The world waited expectantly for clarification of the bullet wounds.

An aura of confusion clouded the picture—due primarily to statements made by some of the doctors at Parkland Memorial Hospital in Dallas at a press conference a short time after the Presidential party left for the return trip to Washington. These doctors, who had worked skillfully at the impossible task of restoring life to the dead President, had observed a wound in the front part of the President's neck, just below the Adam's apple. Dr. Malcolm Perry described it as approximately 5 millimeters (1/5 of an inch) in diameter. It was exuding blood which partially hid edges which were "neither clearcut, that is, punched out, nor were they very ragged." This wound had been *extended* by Dr. Perry's tracheotomy. A tracheotomy is a surgical procedure of forming an opening in the trachea (windpipe) for the purpose of providing an artificial breathing vent in cases where the natural opening in the area of the larynx (voice box) is obstructed.

At no time during the interval that the President's body was in Parkland Memorial Hospital did any of the doctors turn it so that the back portion of the body could be viewed or examined. They, therefore, interpreted the wound in the front part of the neck as being a wound of entrance.

No legitimate criticism whatsoever can be directed against the doctors in Dallas. They performed their futile tasks creditably. None of them had any great experience with bullet wounds in the body, and they could not be expected to make a definitive interpretation of whether the neck wound was a wound of entrance or a wound of exit.

The principal burden of enlightening the Warren Commission on the President's wounds fell upon Commander Humes. In the military hierarchy, he was the senior officer charged with this responsibility, although Colonel Finck had more experience in the field of bullet wounds than the other two doctors combined, and his first-hand autopsy-table case experience was limited.

Commander Humes brought with him several drawings to assist his presentation. He described these drawings:

MR. SPECTER. Dr. Humes, before you identify what that

represents let me place Commission Exhibition No. 385 on it so it may be identified.

(The drawing was marked Commission Exhibit No. 385 for identification).

COMMANDER HUMES. When appraised of the necessity of our appearance before this Commission, we did not know whether or not the photographs which we had made would be available to the Commission. So to assist in making our testimony more understandable to the Commission members, we decided to have made drawings, schematic drawings, of the situation as we saw it, as we recorded it and as we recall it. These drawings were made under my supervision and that of Dr. Boswell by Mr. Rydberg, whose initials are H. A. He is a hospital corpsman, second class, and a medical illustrator in our command at Naval Medical School.

MR. SPECTER. Did you provide him with the basic information from which these drawings were made?

COMMANDER HUMES. Yes, sir.

MR. SPECTER. Distances, that sort of thing?

COMMANDER HUMES. Yes, sir. We had made certain physical measurements of the wounds, and of their position on the body of the late President, and we provided these and supervised directly Mr. Rydberg in making these drawings.

MR. SPECTER. Have you checked the drawings subsequent to their preparation to verify their accuracy?

COMMANDER HUMES. Yes, sir.

MR. SPECTER. And proportion?

COMMANDER HUMES. I must state these drawings are in part schematic. The artist had but a brief period of some 2 days to prepare these. He had no photographs from which to work, and had to work under our description, verbal description, of what we had observed.

MR. SPECTER. Would it be helpful to the artist, in redefining the drawings if that should become necessary, to have available to him the photographs or the X-rays of the President?

COMMANDER HUMES. If it were necessary to have them absolutely true to the scale. I think it would be virtually impossible for him to do this without the photographs.

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MR. SPECTER. And what is the reason for the necessity for having the photographs?

COMMANDER HUMES. I think that it is most difficult to transmit into physical measurements by the—by word the—exact situation as it was seen to the naked eye. The photographs were—there is no problem of scale there because of the wounds, if they are changed in size or changed in size and proportion to the structures of the body and so forth, when we attempt to give a description of these findings, it is the bony prominences, I cannot, which we used as points of reference, I cannot transmit completely to the illustrator where they were situated.

Most medical illustrations in articles and textbooks that relate to anatomy are schematic or diagrammatic in nature. In medico-legal situations, however, where the ultimate in accuracy as to the path of a bullet is the goal, the better procedure is certainly to work from the photographs themselves rather than from a schematic medical illustration prepared not from the photographs which the medical illustrator views, but from a secondhand, hearsay description that is related to him orally. The fact of the matter is that in the case of the assassination the security regulations imposed were so stringent that the real investigative purpose of taking the photographs and the X-rays was completely obscured. As to their use, Commander Humes first testified:

MR. SPECTER. Were the photographs made available then, Dr. Humes, when Exhibit 388 was prepared?

COMMANDER HUMES. No, sir.

MR. SPECTER. All right.

COMMANDER HUMES. The photographs, to go back a moment, the photographs and the X-rays were exposed in the morgue of the Naval Medical Center on this night, and they were not developed, neither the X-rays or the photographs. They were submitted to the, and here, if I make a mistake I am not certain, to either the Federal Bureau of Investigation or to the Secret Service. I am not sure of these.

MR. SPECTER. Did you submit those yourself immediately after they were taken, Dr. Humes?

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COMMANDER HUMES. Again, one of the senior people present, I believe my own Commanding Officer, Captain Stover, took care of turning this material over to these authorities, and receiving a receipt for this information, for this material. It was—I supervised the positioning of the body for various of these examinations but as far as beyond that, I did not consider that my responsibility. . . .

The X-rays, however, do make their appearance later on in Commander Humes' testimony:

. . . In further evaluating this head wound, I would refer back to the X-rays which we had previously prepared. These had disclosed to us multiple minute fragments of radio opaque material traversing a line from the wound in the occiput to just above the right eye, with a rather sizable fragment visible by X-ray just above the right eye. These tiny fragments that were seen dispersed through the substance of the brain in between were, in fact, just that extremely minute, less than 1 mm. in size for the most part.

MR. SPECTER. Will you proceed now, Dr. Humes, to continue your description of the head wound.

COMMANDER HUMES. Head wound—a careful inspection of this large defect in the scalp and skull was made seeking for fragments of missile before any actual detection was begun. The brain was greatly lacerated and torn, and in this area of the large defect we did not encounter any of these minute particles.

I might say at this time that the X-ray pictures which were made would have a tendency to magnify these minute fragments somewhat in size and we were not too surprised at not being able to find the tiny fragments detected in the X-ray.

MR. SPECTER. Approximately how many fragments were observed, Dr. Humes, on the X-ray?

COMMANDER HUMES. I would have to refer to them again, but I would say between 30 or 40 tiny dustlike particle fragments of radio opaque material, with the exception of this one I previously mentioned which was seen to be above and very slightly behind the right orbit.

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. . . I mentioned previously that X-rays were made of the entire body of the late President. Of course, and here I must say that as I describe something to you, I might have done it before or after in the description but for the sake of understanding, we examined carefully the bony structures in this vicinity as well as the X-rays, to see if there was any evidence of fracture or of deposition of metallic fragments in the depth of this wound, and we saw no such evidence, that is no fracture of the bones of the shoulder girdle, or of the vertical column, and no metallic fragments were detectable by X-ray examination.

The ambiguous status of the X-rays is not entirely cleared up even in this portion of the transcript:

MR. SPECTER. Did you search the body to determine if there was any bullet inside the body?

COMMANDER HUMES. Before the arrival of Colonel Finck we had made X-rays of the head, neck and torso of the President, and the upper portions of his major extremities, or both his upper and lower extremities. At Colonel Finck's suggestion, we then completed the X-ray examination by X-raying the President's body in toto, and those X-rays are available.

MR. SPECTER. What did those X-rays disclose with respect to the possible presence of a missile in the President's body?

COMMANDER HUMES. They showed no evidence of a missile in the President's body at any point. And these were examined by ourselves and by the radiologist, who assisted us in this endeavor.

The question that is left dangling is whether the X-rays were developed and available to guide the surgeons during the autopsy, or whether, as Commander Humes first testified, the exposed but *undeveloped* X-rays were turned over to FBI or Secret Service agents, so that they were not studied until after the autopsy was completed and the President's body prepared for burial.

The next routine step in any competent medico-legal autopsy involving bullet wounds, after the external examination and

the X-rays, is to probe the track of the bullet. A stainless steel rod of small diameter is gently inserted and carefully guided through the wound track. This permits an exact determination of the course of the bullet through the body, its point and angle of entrance, and its point and angle of exit.

The futile, inexperienced efforts to probe the wound track in the body, one end of which was in the neck area, are described by Commander Humes:

... Attempts to probe in the vicinity of this wound were unsuccessful without fear of making a false passage. ...

MR. SPECTER. Now, Doctor Humes, at one point in your examination of the President, did you make an effort to probe the point of entry with your finger?

COMMANDER HUMES. Yes, sir; I did.

Commander Humes was detailing a pathetic, fumbling effort to probe with his finger a wound track that had an entrance perforation of no greater than one-quarter of an inch in diameter. While it is readily understood that not all bullet wounds can be probed, particularly those that strike bone, the wound tracks of bullets that course directly through the body and strike only soft tissue can usually be probed by an experienced forensic pathologist.

There are complicating factors that confuse the novice. The bullet expends considerable energy as it moves from side to side through the body, so that the initial track is larger than the bullet itself. In most areas of the body, the wound track then collapses, although its original dimension is more or less fixed if it passes through brain tissue. The structures of the neck area are of varying densities which means that a single wound track here may have a different "feel" as the probe is advanced from the point of entry to the point of exit. Finally, the direction of the wound track may make an apparent change when the body moves. If, as Dr. Helpert believes, President Kennedy received his neck wound while his right hand and arm were raised in a wave to the crowd, the apparent wound track may have been altered slightly when his body was rotated on the autopsy table.

All three of the autopsy surgeons were unanimous in their opinions that the wound through the President's body and neck area did not strike any bony structures. Their lack of experi-

ence, compounded by the pressures of this particular autopsy situation, prevented them from ever successfully probing the President's wound. Their conclusions, therefore, as to the exact route of the bullet through the body are mathematical projections based upon measurements of the position of the two external wounds, one at each end of the track. Because of the tracheotomy which *extended* the wound in the front of the neck, just below the Adam's apple, the exact location of the wound made by the bullet had to be estimated or approximated.

These projections, in turn, were relayed *verbally* to Hospital Corpsman Second Class Rydberg so that he could incorporate them into his schematic drawings. The photographs and X-rays were never made available to him as he constructed the official illustrations which served as the demonstrative aids for the medical testimony. The synthetic character of the drawings is further exaggerated by the artist's arrows, complete with arrow-head and nock, to illustrate the paths of the bullets. They made it appear that the President was shot by bow and arrow.

We *must* accept the fact that these rather amateurish illustrations were *not* drawn to scale. Otherwise, the Commission's report and conclusions are patently inconsistent and obviously invalid. The size and shape of the bullet wound in the back of the President's neck is presented by the artist in such a way in Commission Exhibit 388 that it must either be a wound of exit or, if a wound of entrance, one made by a bullet of considerably larger caliber than the one fired from the rifle found on the sixth floor of the Texas School Book Depository Building.

To set the stage for the conclusions he would draw, Commander Humes described *four* wounds in the President's body, two in the head and two in the region of the neck. To avoid confusion in studying his testimony, it is necessary to remember that *each* bullet that passes through the body is said to create *two* wounds. One is the wound of entry; the other, the wound of exit. Commander Humes, therefore, in discussing *four* wounds was talking about the damage done by *two* bullets only, each of which created its own wound of entry and its wound of exit.

One of the head wounds was located 2.5 centimeters (approximately 1 inch) to the right and slightly above the large bony protrusion (external occipital protuberance) which juts out at the center of the lower part of the back of the skull. It

measured 6 by 15 millimeters ($1/4$ of an inch by $5/8$ of an inch).

The second head wound was massive, measuring approximately 13 centimeters (5 inches) in its greatest diameter. It was difficult to measure accurately because multiple crisscross fractures of the skull radiated from the large defect. It involved the right and frontal portion of the skull, which had been exploded off by the force of the bullet. During the autopsy, Federal agents brought the surgeons three pieces of bone recovered from Elm Street in Dallas and from the Presidential automobile. When put together, these fragments accounted for approximately three-quarters of the missing portion of the skull.

There was another wound near the base of the back of the President's neck, slightly to the right of his spine. It was described as being approximately 14 centimeters ($5\frac{1}{2}$ inches) from the tip of the acromion (right shoulder joint) and approximately $5\frac{1}{2}$ inches below the tip of the right mastoid process, the bony point immediately behind the ear. This wound measured 7 by 4 millimeters (approximately $1/4$ by $1/7$ of an inch). It had clean edges and was sharply delineated.

The fourth wound was the one in the front part of the neck, just below the Adam's apple, which Commander Humes describes:

Now, as the President's body was viewed from anteriorly in the autopsy room, and saying nothing for the moment about the missile, there was a recent surgical defect in the low anterior neck, which measured some 7 or 8 cm. in length or let's say a recent wound was present in this area.

This wound was through the skin, through the subcutaneous tissues and into the larynx. Or rather into the trachea of the President.

MR. SPECTER. To digress chronologically—

COMMANDER HUMES. Yes.

MR. SPECTER. Did you have occasion to discuss that wound on the front side of the President with Dr. Malcolm Perry of Parkland Hospital in Dallas?

COMMANDER HUMES. Yes, sir; I did. I had the impression from seeing the wound that it represented a surgical tracheotomy wound, a wound frequently made by

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surgeons when people are in respiratory distress to give them a free airway.

To ascertain that point I called on the telephone Dr. Malcolm Perry and discussed with him the situation of the President's neck when he first examined him . . .

Some of the difficulties and discomfort experienced by the autopsy surgeons are explained when it is understood that this telephone conversation between Commander Humes and Dr. Perry did not take place until the following morning, at which time the President's body was already resting in the White House. Lacking the medical history of what had transpired in Parkland Hospital in Dallas, the autopsy surgeons during the time that they had the President's body in front of them labored under the impression that they were working with only three bullet wounds, the two in the head and the one in the back of the neck. They attributed the wound in the front of the neck to the tracheotomy.

This caused them grave concern and anguish. Their inexperienced efforts to probe the neck wound were made at a time when they assumed that the bullet must still be in the President's body since there was no separate wound of exit.

Commander Humes explains their perplexity:

MR. SPECTER. Now, Dr. Humes, at one point in your examination of the President, did you make an effort to probe the point of entry with your finger?

COMMANDER HUMES. Yes, sir; I did.

MR. SPECTER. And at about the time that you were trying to ascertain, as you previously testified, whether there was any missile in the body of the President, did someone from the Secret Service call your attention to the fact that a bullet had been found on a stretcher at Parkland Hospital?

COMMANDER HUMES. Yes, sir; they did.

MR. SPECTER. And in that posture of your examination, having just learned of the presence of a bullet on a stretcher, did that call to your mind any tentative explanatory theory of the point of entry or exit of the bullet which you have described as entering at point "C" on Exhibit 385?

COMMANDER HUMES. Yes, sir. We were able to ascertain with absolute certainty that the bullet had passed by the apical portion of the right lung, producing the injury which we mentioned.

I did not at that point have the information from Dr. Perry about the wound in the anterior neck, and while that was a possible explanation of the point of exit, we also had to consider the possibility that the missile in some rather inexplicable fashion had been stopped in its path through the President's body and, in fact, then had fallen from the body onto the stretcher.

MR. SPECTER. And what theory did you think possible, at that juncture, to explain the passing of the bullet back out of the point of entry; or had you been provided with the fact that external heart massage had been performed on the President?

COMMANDER HUMES. Yes, sir; we had, and we considered the possibility that some of the physical maneuvering performed by the doctors might have in some way caused this event to take place.

MR. SPECTER. Now, have you since discounted that possibility, Doctor Humes?

COMMANDER HUMES. Yes; in essence we have . . .

The autopsy surgeons were considerably relieved by the receipt of this information. It permitted them to end their futile search for the missing bullet which was not in the President's body. They now believed that the bullet accidentally found on a stretcher in Parkland Hospital had been recovered from the stretcher on which the President's body had rested. This assumption, in all probability, was correct, even though the final report tortured the evidence, on Assistant Counsel Specter's persuasion, to conclude that the bullet was fortuitously found on the stretcher which held Governor Connally during his period in the emergency room at the hospital.

The truth of the matter is that no one will ever know for sure which stretcher held the bullet. Its discovery, however, did affect the course of the autopsy. The doctors thankfully abandoned their search, "presumed" with the self-assurance of the "hospital" autopsy atmosphere to which they were accustomed that they had solved the mysteries of the bullet wounds, and

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continued with a routine, systematic examination of the body cavities.

They experienced no obvious discomfort in adopting the theory that the wound in the back of the neck area was *both* a wound of entry and a wound of exit. Until the following morning, when Commander Humes telephoned Dr. Perry in Dallas, they still regarded the opening in the front of the neck as a surgical wound only.

The stubborn, persistent search of the President's body for a bullet that was not in it, a search which was abandoned only after information was relayed from Dallas that a bullet had been found in the hospital, sheds considerable light on the initial X-rays. Either the surgeons did not have them available, or for some reason, they doubted their own ability to read and interpret them. Whatever the reason, they elected to pursue a physical, manual attempt to probe for the missing bullet instead of confidently relying on the X-rays to tell them that no bullet was present.

The preliminaries were now established for the task of explaining the President's bullet wounds to the world, through the artificial, administrative forum of the Warren Commission; and Commander Humes rose to the demands of the occasion. Although his experience had been "more in the field of natural disease than violence," he succumbed to the intoxicating vapors and endemic infections of the witness-box. He developed a full-blown case of "witness-chairitis" which magically transformed him into an expert on every phase of the subject of bullet wounds in the body. Having had the final look, he proceeded to his biblical right of the final word.

How could there be two separate wound tracks or paths made by a single bullet through the President's brain? Commander Humes had his answer:

MR. SPECTER. Dr. Humes, would you elaborate on the differences in the paths, especially why the bullet went in one direction in part and in part in the second direction, terminating with the fragment right over the right eye?

COMMANDER HUMES. Yes, sir.

I will make a drawing of the posterior portion of the skull showing again this beveling which we observed at the inner table of the skull.

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Our impression is that as this projectile impinged upon the skull in this fashion, a small portion of it was dislodged due to the energy expended in that collision, if you will, and that it went off at an angle, and left the track which is labeled 388, which is labeled on Exhibit 388 from "A", point "A" to the point where the fragment was found behind the eye.

Why a fragment takes any particular direction like that is something which is difficult of scientific explanation. Those of us who have seen missiles strike bones, be it the skull or a bone in the extremity, have long since learned that portions of these missiles may go off in various directions and the precise physical laws governing them are not clearly understood.

Had dum dum bullets been used? Commander Humes expounded on this:

MR. SPECTER. Do you have an opinion, Dr. Humes, as to whether there were dum dum bullets used specifically on the wound which struck point "A" on the head, on 388?

COMMANDER HUMES. I believe these were not dum dum bullets, Mr. Specter. A dum dum bullet is a term that has been used to describe various missiles which have a common characteristic of fragmenting extensively upon striking.

MR. SPECTER. Would you characterize the result and effect on this bullet as not extensive fragmenting?

COMMANDER HUMES. Yes. Had this wound on point "A" on Exhibit 388 been inflicted by a dum dum bullet, I would anticipate that it would not have anything near the regular contour and outline which it had. I also would anticipate that the skull would have been much more extensively disrupted, and not have, as was evident in this case, a defect which quite closely corresponded to the overlying skin defect, because that type of a missile would fragment on contact and be much more disruptive at this point.

What was the physical mechanism of the brain injury? Commander Humes continued:

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... When the brain was turned over and viewed from its basular or inferior aspect, there was found a longitudinal laceration of the mid-brain through the floor of the third ventricle, just behind the optic chiasm and the mammillary bodies.

The laceration partially communicates with an oblique 1.5 cm. tear through the left cerebral peduncle. This is a portion of the brain which connects the higher centers of the brain with the spinal cord which is more concerned with reflex actions.

There were irregular superficial lacerations over the basular or inferior aspect of the left temporal or frontal lobe. We interpret that these later contusions were brought about when the disruptive force of the injury pushed that portion of the brain against the relatively intact skull.

This has been described as contre-coup injury in that location.

The fragments recovered were what proportion of the bullet?

MR. DULLES. Could one say as to what portion of the bullet was found in all these fragments, I mean arrive at an estimate, was it a tenth of the bullet, was it, how much was it, assuming the type of bullet that we believe was used in this particular rifle?

COMMANDER HUMES. Sir, I have not had an opportunity to personally examine the type of bullet which is believed to have been represented by this injury.

However, I would estimate—if I understand you correctly the total amount that was present in the President's skull and brain?

MR. DULLES. Yes.

COMMANDER HUMES. Including the fragments?

MR. DULLES. Including all the fragments.

COMMANDER HUMES. Including all these minute particles, I would say there was something less than one-tenth of the total volume of the missile.

Could the diameter of the bullet (its caliber) have been different from one fired from the rifle found on the sixth floor

of the Texas School Book Depository Building? Commander Humes had an authoritative answer:

MR. McCLOY. Perhaps this was something that Colonel Finck could testify to exactly, but, he would be quite competent. Is there anything to indicate that this was, might have been a larger than a 6.5 or smaller than a 6.5?

COMMANDER HUMES. The size of the defect in the scalp, caused by a projectile could vary from missile to missile because of elastic recoil and so forth of the tissues.

However, the size of the defect in the underlying bone is certainly not likely to get smaller than that of the missile which perforated it, and in this case, the smallest diameter of this was approximately 6 to 7 mm., so I would feel that there would be the absolute upper limit of the size of this missile, sir.

MR. McCLOY. Seven would be the absolute upper limit?

COMMANDER HUMES. Yes, sir; and, of course, just a little tilt could make it a little larger, you see.

Again, on the mechanism of the massive head injury, Commander Humes rises to the occasion:

MR. DULLES. I have one other question, if I may?

Is the incidence of clean entry as indicated there, and then great fragmentation on exit, is that a normal consequence of this type of wound?

COMMANDER HUMES. Sir, we feel that there are two potential explanations for this.

One, having traversed the skull in entrance in the occiput as depicted on 388, the missile begins to tumble, and in that fashion it presents a greater proportion of its surface to the brain substance and to the skull as it makes its egress.

The other and somewhat more difficult to measure, and perhaps Colonel Finck will be able to testify in greater detail on this, is that a high velocity missile has tremendous kinetic energy, and this energy is expanded against the structures which it strikes, and so that much of this defect could be of the nature of blast, as this kinetic energy is dissipated by traversing the skull.

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Is that the sense of the question, sir?

MR. DULLES. Yes.

The trajectory of the bullets? Commander Humes gave a long, rambling answer to conform to the preestablished theory of the Commission that all the shots were fired from the window of the Texas School Book Depository Building. When boiled down, it was:

COMMANDER HUMES. The degree of angle?

SENATOR COOPER. The angle, yes, the degree of angle of the missile from the building.

COMMANDER HUMES. Yes, sir; there is one difficulty, and that is the defect of exit was so broad that one has to rely more on the inclination of the entrance than they do connecting in this instance entrance and exit because so much of the skull was carried away in this fashion.

SENATOR COOPER. That was my second question.

My first question was would it be possible physically to establish the degree of angle of the trajectory of the bullet?

COMMANDER HUMES. Within limited accuracy, sir?

SENATOR COOPER. Within limited accuracy.

That being true then my second question was whether the point of entry of the bullet, point A, and the, what you call the exit—

COMMANDER HUMES. Exit.

SENATOR COOPER. Did you establish them so exactly that they could be related to the degree of angle of the trajectory of the bullet?

COMMANDER HUMES. Yes, sir; to our satisfaction we did ascertain that fact.

What about holes and defects in the clothing which the President wore and which Commander Humes only saw for the first time the preceding day? It was an uncomfortable question, but he did the best he could to make the holes in the clothing correspond to the wound in the back of the neck. He thought it a difficult hurdle, since the holes in the clothing were actually lower than the neck wound:

MR. SPECTER. Now, how if at all, do the holes in the shirt and coat conform to the wound of entrance which

you described as point "C" on Commission Exhibit 385?

COMMANDER HUMES. We believe that they conform quite well. When viewing—first of all, the wounds or the defects in 393 and 394 coincide virtually exactly with one another.

They give the appearance when viewed separately and not as part of the clothing of a clothed person as being, perhaps, somewhat lower on the Exhibits 393 and 394 than we have depicted them in Exhibit No. 385. We believe there are two reasons for this.

385 is a schematic representation, and the photographs would be more accurate as to the precise location, but more particularly the way in which these defects would conform with such a defect on the torso. It would depend on the girth of the shoulders and configuration of the base of the neck of the individual, and the relative position of the shirt and coat to the tissues of the body at the time of the impact of the missile.

MR. SPECTER. As to the muscular status of the President, what was it?

COMMANDER HUMES. The President was extremely well developed, an extremely well-developed muscular young man with a very well-developed set of muscles in his thoraco and shoulder girdle.

MR. SPECTER. What effect would that have on the positioning of the shirt and the coat with respect to the position of the neck in and about the seam?

COMMANDER HUMES. I believe this would have a tendency to push the portions of the coat which show the defects here somewhat higher on the back of the President than on a man of less muscular development.

MR. SPECTER. . . . Will you describe, Dr. Humes, the position of President Kennedy's right hand in that picture?

COMMANDER HUMES. Yes. This exhibit, Commission Exhibit No. 396, allegedly taken just prior to the wounding of the late President, shows him with his hand raised, his elbow bent, apparently in saluting the crowd. I believe that this action—

MR. SPECTER. Which hand was that?

COMMANDER HUMES. This was his right hand, sir. I be-

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lieve that this action would further accentuate the elevation of the coat and the shirt with respect to the back of the President.

MR. SPECTER. Now, Dr. Humes, would you take Commission Exhibit No. 395—

MR. MCCLOY. Before you go, may I ask a question?

In your examination of the shirt, I just want to get it in the record, from your examination of the shirt, there is no defect in the collar of the shirt that coincides with the defect in the back of the President's coat, am I correct?

COMMANDER HUMES. You are correct, sir. There is no such defect.

The point of fire?

MR. DULLES. So then the shot would have been fired from some point above the head of the person hit?

COMMANDER HUMES. Yes, sir.

Commander Humes experienced no difficulty in girding up his loins so that he could discuss Governor Connally's wounds in great detail. He expounded on the bullet, its path through the President's body, its velocity after it passed through, the bullet's metal jacket, all in support of the premise that Governor Connally was struck by the same bullet that passed through the President's neck.

On the question of greatest concern to the Warren Commission, which were the wounds of entrance and which were the wounds of exit on the President's body, Commander Humes first quoted a few of the textbook criteria for making such a determination. He then confidently expressed his opinions:

MR. SPECTER. Dr. Humes, as to points of entry on the body of the late President, how many were there in total?

COMMANDER HUMES. Two, sir, as depicted in 385-C and 388-A.

MR. SPECTER. As to points of exit, how many were there?

COMMANDER HUMES. Two, sir, as depicted on 385-D and the vicinity of 388-B. I make the latter remark as was developed earlier, in that the size of the large defect in the skull was so great and the fragmentation was

so complex that it was impossible to accurately pinpoint the exit of the missile in the head wound.

MR. SPECTER. Now as to that last factor, would the X-rays be of material assistance to you in pinpointing the specific locale of the exit?

COMMANDER HUMES. I do not believe so, sir. The only path that the X-rays show in any detail are of the minor fragments which pass from point A to point B.

In other words, the bullet through the head entered at the back of the head and made its exit somewhere toward the front and right portion of the skull.

As to the wound through the neck, Commander Humes continues:

We reached the conclusion that point "C" was a point of entry.

MR. SPECTER. What characteristics of that wound led you to that conclusion?

COMMANDER HUMES. The characteristics here were basically similar to the characteristics above, lacking one very valuable clue or piece of evidence rather than clue, because it is more truly a piece of evidence in the skull. The skull as I mentioned before had the bone with the characteristic defect made as a missile traverses bone.

The missile, to the best of our ability to ascertain, struck no bone protuberances, no body prominences, no bone as it traversed the President's body. But it was a sharply delineated wound. It was quite regular in its outline. It measured, as I mentioned, 7 by 4 mm. Its margins were similar in all respects when viewed with the naked eye to the wound in the skull, which we feel incontrovertibly was a wound of entrance.

The defect in the fascia, which is that layer of connective tissue over the muscle just beneath the wound, corresponded virtually exactly to the defect in the skin.

And for these reasons we felt that this was a wound of entrance.

MR. SPECTER. What conclusion, if any, did you reach as to whether point "D" on 385 was the point of entrance or exit?

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COMMANDER HUMES. We concluded that this missile depicted in 385 "C" which entered the President's body traversed the President's body and made its exit through the wound observed by the physicians at Parkland Hospital and later extended as a tracheotomy wound.

MR. SPECTER. Does the description "ragged wound" which is found in the Parkland report shed any light in and of itself as to whether point "D" is an exit or entry wound?

COMMANDER HUMES. I believe, sir, that that statement goes on, ragged wound in the trachea. I don't believe that refers to the skin and you might say that it is a ragged wound is more likely to be a wound of exit.

However, the trachea has little cartilaginous rings which have a tendency, which would be disrupted by this, and most wounds of the trachea unless very closely incised would perhaps appear slightly ragged.

But had Dr. Perry called this a "ragged wound"?

Dr. Malcolm Perry had observed it as exuding blood which partially hid edges which were "neither clean-cut, that is, punched out, nor were they very ragged."

Although this wound in the front of the President's throat, as it appeared initially, was seen only by the doctors at Parkland Hospital before they *extended* it in performing the tracheotomy, there was absolutely no doubt in Commander Humes' mind but that it was a wound of exit:

MR. DULLES. Just one other question.

Am I correct in assuming from what you have said that the wound is entirely inconsistent with a wound that might have been administered if the shot were fired from in front or the side of the President: It had to be fired from behind the President?

COMMANDER HUMES. Scientifically, sir, it is impossible for it to have been fired from other than behind. Or to have exited from other than behind.

Toward the end of Commander Humes' substantive testimony about the President's wounds, Commission member Gerald Ford voiced his misgivings as to the pictures and X-rays.

REPRESENTATIVE FORD. May I ask what size are the pictures to which you refer?

COMMANDER HUMES. We exposed both black and white and color negatives, Congressman. They were exposed in the morgue during the examination. They were not developed. The Kodachrome negatives when developed would be 405. They were in film carriers or cassettes as were the black and white. Of course, they could be magnified.

REPRESENTATIVE FORD. Have those been examined by personnel at Bethesda?

COMMANDER HUMES. No, sir. We exposed the negatives; we turned them over. Here I must ask the counsel again for advice—to the Secret Service.

MR. SPECTER. Yes; it was the Secret Service.

COMMANDER HUMES. They were turned over to the Secret Service in their cassettes unexposed, and I have not seen any of them since. This is the photographs. The X-rays were developed in our X-ray department on the spot that evening, because we had to see those right then as part of our examination, but the photographs were made for the record and other purposes.

REPRESENTATIVE FORD. But they had never been actually developed for viewing.

COMMANDER HUMES. I do not know, sir.

Commander Humes had completely reversed his earlier testimony that "neither the X-rays or the photographs" were developed the night of the autopsy but were turned over to the FBI or Secret Service, exposed but not developed.

Assistant Commission Counsel Specter next proceeded to tidy up the record. He introduced approximately fifteen pages of longhand notes which Commander Humes had made during the performance of the autopsy. The transcript continues:

MR. SPECTER. Are there any notes which you made at any time which are not included in this group of notes?

COMMANDER HUMES. Yes, sir; there are.

MR. SPECTER. And what do those consist of?

COMMANDER HUMES. In privacy of my own home, early in the morning of Sunday, November 24th, I made a draft of this report which I later revised, and of which

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this represents the revision. That draft I personally burned in the fireplace of my recreation room.

There is no way of knowing at this stage just exactly what Commander Humes' initial, independent conclusions were. The transcript, however, does contain this interesting exchange:

MR. SPECTER. Now, just one point on the notes themselves. Page 14 of your rough draft, Doctor Humes, as to the point of origin, the notes showed that there was a revision between your first draft and your final report.

COMMANDER HUMES. Yes, sir.

MR. SPECTER. Will you first of all read into the record the final conclusion reflected in your final report.

COMMANDER HUMES. I would rather read it from the final report. The final report reads:

"The projectiles were fired from a point behind and somewhat above the level of the deceased."

MR. SPECTER. And what did the first draft of that sentence as shown on page 14 of your rough draft state?

COMMANDER HUMES. It read as follows:

"The projectiles were fired from a point behind and somewhat above a horizontal line to the vertical position of the body at the moment of impact."

MR. SPECTER. Now would you state the reason for making that modification between draft and final report, please?

COMMANDER HUMES. This examination, as I have indicated, was performed by myself with my two associates. The notes which we have just admitted as an exhibit are in my own hand and are my opinion, was my opinion at that time, as to the best way of presenting the facts which we had gleaned during this period.

Before submitting it to the typist, I went over this with great care with my two associates. One or the other of them raised the point that perhaps this sentence would state more than what was absolutely fact based upon our observations, pointing out that we did not know precisely at that time in what position the body of the President was when the missiles struck, and that therefore we should be somewhat less specific and somewhat more circumspect than the way we stated it.

When I considered the suggestion, I agreed that it would be better to change it as noted, and accordingly, I did so.

All told, Commander Humes' testimony consumes less than thirty pages of transcript. Commander Boswell's contribution is less than a page. He merely corroborated Commander Humes' opinion and stated that he had nothing of value to add.

Colonel Finck's testimony runs for seven pages. His major contribution was in the form of an illustrated lecture as to how he could determine wounds of entrance and wounds of exit:

MR. SPECTER. Have you had occasion to conduct any experiments on the effect of missile penetration of the brain reflected in the chart which you have brought with you here today?

COLONEL FINCK. No, sir.

MR. SPECTER. Of the skull—let me phrase the question this way: What does the test which is depicted on the document before you relate to?

COLONEL FINCK. It is based on my observations, not on experiments.

MR. SPECTER. Would you pass that to me, sir, so that I may mark that as a Commission Exhibit, and then I will ask you to identify it, please?

Mr. Chief Justice, may I mark this Commission Exhibit No. 400 a document?

THE CHAIRMAN. It may be marked.

(The document was marked Commission Exhibit No. 400 for identification.)

MR. SPECTER. I will ask Dr. Finck to describe it for us, please.

COLONEL FINCK. This is a scheme which I prepared before the 22nd of November. It is a teaching scheme, but it does apply to the case in discussion. It will be a help in understanding how I could identify the entrance and the exit by examination of bone. "A" represents the bony portion of the skull. "B" represents the cavity of the head, the cranial cavity. "C" represents the entrance and "D" represents the exit. The arrows indicate the missile path.

This scheme is based upon observation of through and through wounds of bone, and the same differences

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apply to a pane of glass. The surface struck first by the missile in relation to the surface struck next by the missile, this one, shows a smaller diameter, which means that if you look at the route of entrance in this case here, "C" from the outside you will not see a crater. If you examine it from the inside, you will see a crater corresponding to the beveling, coning, shelving, previously described by Commander Humes.

In the case we are discussing today, it was possible to have enough curvature and enough portion of the crater to identify positively the wound of entrance at the site of the bone.

MR. SPECTER. Relating then your evaluation of the situation with respect to President Kennedy, and turning to Commission Exhibit No. 388, what is your opinion as to whether the point "A" is a wound of entrance or exit?

COLONEL FINCK. My opinion as regards Exhibit 388, letter "A" is that this wound is a wound of entrance.

MR. SPECTER. And what are the characteristics of that wound which leads you to that conclusion?

COLONEL FINCK. The characteristics were that seen from the inside of the skull, I could see a beveling in the bone, a beveling that could not be seen when the wound was seen from outside the skull.

MR. SPECTER. Are there any other individual characteristics that led you to conclude "A" was the wound of entrance?

Although he does not state it in so many words, it is obvious that Colonel Finck's theory concerning the head wound is that the bullet split into at least two parts when it crashed into the President's skull:

MR. SPECTER. One more question, Mr. Chief Justice.

On 388, point A to B, what is your view, Doctor Finck, as to whether or not this is represented by a straight line going back to the point of origin of the weapon?

COLONEL FINCK. The difficulty in interpreting the path in line A-B of Commission's Exhibit 388 is that, one, there is, as stated before, a large wound of exit, and

two, there is a secondary path as indicated by the fragments recovered. So we can have an assumption and state that the general direction, the general path, the general angle of this missile was from behind and above, and that the bullet markedly fragmented, went out of the President's head on the right side, but that a portion of this bullet which badly fragmented was recovered within the skull.

Colonel Finck did have sufficient familiarity in the field of bullet wounds in the body to know the name of the authoritative text on the subject.

REPRESENTATIVE FORD. How many cases did you investigate to develop this theory shown by Commission Exhibit 400?

COLONEL FINCK. Among the more than four hundred cases I have reviewed, several of them—I cannot give you an exact figure, I do not tabulate them, but many of them had through-and-through wounds of the skull as well as of flat bones, as, for instance, the sternum, the bone we have in front of our chest, and this would apply also to a through-and-through wound of the sternum. I have had cases like that.

There was a specific case in which I was able to identify the entrance at the level of the sternum on the same basis as the criteria I have given for the skull. Whenever a bullet goes through a flat bone, it will produce that beveling, that cratering, shelving, and that I have seen in numerous cases.

REPRESENTATIVE FORD. Is this a generally accepted theory in the medical profession?

COLONEL FINCK. Yes, sir; it is. Am I allowed to quote a standard textbook?

THE CHAIRMAN. You may; yes, sir.

COLONEL FINCK. The textbook of legal medicine, pathology and toxicology by Gonzalez, Vance, Helpern and Umberger does not give a scheme like I have shown to you today, but describes similar criteria.

As you know, one of the authors of the book I mentioned is still chief medical examiner of New York City, with 20,000 medical-examiner cases a year.

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This was the evidence on which the Warren Commission issued its official, authoritative report as to the medical nature of the bullet wounds which killed the President.

One continuing theme permeates the entire final work. It is the demand that the medical evidence be interpreted so as to be consistent with the already well-established theory that all of the bullets involved were fired from a single rifle found in the sixth-floor room of the Texas School Book Depository Building. This theme is clearly illustrated by an excerpt from the final Commission summary:

"The findings of the doctors who conducted the autopsy were consistent with the observations of the doctors who treated the President at Parkland Hospital. Dr. Charles S. Carrico, the resident surgeon at Parkland, noted a small wound approximately 1/4 of an inch in diameter (5 to 8 millimeters) in the lower third of the neck below the Adam's apple. Dr. Malcolm O. Perry, who performed the tracheotomy, described the wound as approximately 1/5 of an inch in diameter (5 millimeters) and exuding blood which partially hid edges that were 'neither clean-cut, that is, punched out, nor were they very ragged.' Dr. Carrico testified as follows:

Q. Based on your observations on the neck wound alone did you have a sufficient basis to form an opinion as to whether it was an entrance or an exit wound?

A. No, sir; we did not. Not having completely evaluated all the wounds, traced out the course of the bullets, this wound would have been compatible with either entrance or exit wound depending upon the size, the velocity, and the tissue structure and so forth.

The same response was made by Dr. Perry to a similar query:

Q. Based on the appearance of the neck wound alone, could it have been either an entrance or an exit wound?

A. It could have been either.

Then the doctor was asked to take into account the other known facts, such as the autopsy findings, the approximate

distance the bullet traveled, and tested muzzle velocity of the assassination weapon. With these additional factors, the doctors commented on the wound on the front of the President's neck as follows:

DR. CARRICO. With these facts and the fact as I understand it no other bullet was found this would be, this was, I believe, was an exit wound.

DR. PERRY. A full jacketed bullet without deformation passing through the skin would leave a similar wound for an exit and entrance wound and with the facts which you have made available and with these assumptions, I believe that it was an exit wound."

This was the testimony that satisfied the Commission and permitted it to conclude that "the findings of the doctors who conducted the autopsy were consistent with the observations of the doctors who treated the President at Parkland Hospital."

"The tragic, tragic thing," Dr. Helpern explains in summarizing his comments on the medico-legal aspects of President Kennedy's death, "is that a relatively simple case was horribly snarled up from the very beginning; and then the errors were compounded at almost every other step along the way. Here is a historic event that will be discussed and written about for the next century, and gnawing doubts will remain in many minds, no matter what is done or said to dispel them."

What were these step-by-step errors?

"I've already touched on the gravest of them all—the selection of a 'hospital' pathologist to perform a medico-legal autopsy. This stemmed from the mistaken belief that because a man can supervise a laboratory or perform a hospital autopsy to see whether a patient died from emphysema or heart disease, he is qualified to evaluate gunshot wounds in the body. It's like sending a seven-year-old boy who has taken three lessons on the violin over to the New York Philharmonic and expecting him to perform a Tchaikovsky symphony. He knows how to hold the violin and bow, but he has a long way to go before he can make music."

Does this observation apply to Lieutenant Colonel Pierre Finck?

"Colonel Finck's position throughout the entire proceeding was extremely uncomfortable. If it had not been for him, the autopsy would not have been handled as well as it was; but he

was in the role of the poor bastard Army child foisted into the Navy family reunion. He was the only one of the three doctors with *any* experience with bullet wounds; but you have to remember that his experience was limited primarily to 'reviewing' files, pictures, and records of finished cases. There's a world of difference between standing at the autopsy table and trying to decide whether a hole in the body is a wound of entrance or a wound of exit, and in reviewing another man's work at some later date in the relaxed, academic atmosphere of a private office. I know, because I've sweated out too many of these cases during the past thirty-five years. Colonel Finck is extremely able in the type of administrative work which has been assigned him over the years."

Are there any crucial steps that should have been taken that were omitted that Friday evening in the autopsy room at the Naval Medical School?

"The major problem in any gunshot case, of course, is to determine which is the wound of entry, and the wound of exit. This is basic. All the so-called critics of the Warren Commission Report would be left dangling in mid-air with their mouths gaping unless they can suggest or argue that the hole in the front of the President's throat was a wound of entrance. Deprive them of this opportunity for speculation and you pull the rug right out from under them. Give it to them, and they now have it, and they can bring in all kinds of unreliable eyewitness reports of shots coming from the bridge across the underpass, or from behind the screen of trees in Dealey Plaza, and puffs of blue smoke that remained suspended in the air with police officers scrambling up the bank to investigate these illusory puffs of smoke. Smoke from gunshots just doesn't behave like that!"

Specifically, how could a positive determination have been made at the time of the autopsy that the throat wound was a wound of exit or a wound of entrance?

"In a great many cases, the only safe way to reach a conclusive decision is to compare the size and characteristics of each wound on the end of the wound track. It's easy for textbook writers and their readers to assert pontifically that the wound of exit is *always* larger than the wound of entrance, and the wound of exit is ragged whereas the wound of entry is smooth, so that you have no difficulty in taking a gross, eyeball look and saying 'this is the entry wound' or 'that is the exit

wound.' This isn't true at all. The difference between the entry wound and the exit wound is frequently a lot more subtle than that. Many of the wounds require careful and painstaking study before you can reach a decision."

But wasn't the throat wound gone at the time of the autopsy? In one place, the Warren Commission Report states: "At that time they [the autopsy surgeons] did not know that there had been a bullet hole in the front of the President's neck when he arrived at Parkland Hospital because the tracheotomy incision had completely eliminated that evidence." At another point the report says: "... since the exit wound was obliterated by the tracheotomy."

"No, you see, the staff members who wrote that portion of the report simply did not understand their medical procedures; and they did not know enough to seek medical guidance. Here's what the autopsy protocol says about this throat wound: '... it was extended as a tracheotomy incision and thus its character is distorted at the time of autopsy.' The key word here is *extended*. That bullet wound was not 'eliminated' or 'obliterated' at all. What Dr. Perry did was to take his scalpel and cut a clean slit away from the wound. He didn't excise it, or cut away any huge amount of tissue, as the report writer would have you believe."

What about the description in the autopsy protocol that "its character is distorted"?

"Certainly, its character is distorted in the sense that the original wound was *extended* in length by Dr. Perry's scalpel; but this throat wound could still have been evaluated. Its edges should have been carefully put back together and restored to their original relationships as nearly as possible. It should have then been studied, and finally photographed. By comparing this throat wound with the wound in the back of the neck, there should have been no room for doubt as to which wound was of entry and which of exit. This would automatically establish the course of the bullet, whether from front to back, or back to front."

Why wasn't this procedure followed?

"I can't crawl into the minds of the surgeons and answer for them. I can only offer my own speculative opinion. In the first place, their lack of experience deprived them of the knowledge of what should have been done. Secondly, it appears from every facet of the evidence now available that at the time they

finished their autopsy and closed the body so that it could be prepared for burial, they labored under the illusion that the hole in the back of the neck was *both* a wound of entrance and a wound of exit. They thought the throat wound was nothing more than a surgical wound, so there was no need to pay it any special attention."

Are there any other procedures followed by the autopsy surgeons that have furnished ammunition to the critics of the Warren Commission Report?

"Unfortunately, there are. The phraseology in the formal autopsy protocol itself implies or suggests that the doctors still harbored doubts and uncertainties at the time it was written. In speaking of the neck wounds, the protocol describes them as 'presumably of entry' and 'presumably of exit.' It says: 'As far as can be ascertained this missile struck no bony structures in its path through the body.' Well, that just doesn't read like the work of men in confident command of their ship."

"On the other side of the coin, the writers of the Warren Commission Report went to the opposite extreme when they tried to force a unanimity of opinion on all the doctors at Parkland Hospital in support of the autopsy surgeons that the throat wound had to be a wound of exit. When you put too much tension on the evidence, by pulling and tugging it, in an effort to mold it to the shape of a preconceived conclusion, you leave yourself pretty vulnerable."

What about Commander Humes burning his original notes of his draft of the autopsy protocol?

"It's extremely unfortunate that he did; but I interpret this only as further evidence of his lack of experience in medico-legal situations. I can't believe that there's anything sinister about it as some of the critics would have you believe. Commander Humes simply did not appreciate that this was not just another hospital autopsy, and that every note or memorandum should be saved for later scrutiny."

Some of the critics of the Warren Commission Report have attempted to bolster their attacks by alleging that Commander Boswell's drawing (a portion of Commission Exhibit 397) shows the bullet wound in the back of the neck as being down about the level of the shoulder blades. Is this significant?

"It's significant in that it demonstrates the total ignorance of the critics in the matter of autopsy procedures. We don't need to spend any time on trivia like this; but for their information,

this is simply part of the work sheet. It contains two purely schematic drawings of the human figure, one front and one rear, in what is known as the 'quasi-anatomic position.' The doctor doing the autopsy uses them as a shorthand way of making notes on what he observes during his external examination of the body. Commander Boswell sketched in a number of observations including the surgical wounds, the old scar from the President's back operation, and the bullet holes. No one ever pretends that these markings are drawn to scale. To take the time to do this would defeat the entire purpose of this shorthand way of making notes. The written material in the autopsy protocol is what matters."

Some critics have alleged some sort of duplicity because an FBI report dated December 9, 1963, and another one dated January 13, 1964, apparently contain information which is not consistent with the formal autopsy protocol.

"This is more trivia and underbrush. What difference does it make what these two FBI reports said? The controlling factor insofar as the medico-legal phase of the investigation is concerned is the autopsy protocol itself. There was undoubtedly conversation going on in the autopsy room. The FBI agent there probably heard the doctors agonizing over their inability to find the bullet. He observed them trying to probe the neck wound. He heard their speculations that the hole in the back of the neck was *both* a wound of entrance and a wound of exit. To me, all these particular FBI reports show is exactly what we have mentioned before: at the time the autopsy was finished, the doctors thought they were dealing with only three bullet holes, two in the head and one in the *back* of the neck."

Where did the Warren Commission, as distinguished from the autopsy surgeons, fail to clarify the medical issues of the President's death?

"It failed tragically because it did not have sufficient knowledge in the field of forensic medicine to even appreciate the need to call in an expert with experience in bullet wounds in the body. This lack of knowledge is evident in the official report itself. For example, it contains thousands of exhibits in eleven volumes. They include all sorts of meaningless pictures of Marina Oswald, Oswald's mother, Oswald as a young boy, Jack Ruby's employees or girl friends in varying states of attire, and nine X-rays of Governor Connally's body.

"The X-rays of President Kennedy's body, however, were

not considered significant enough to the entire investigation to be filed as exhibits to the report. The same holds true of the black and white and the color pictures of the bullet wounds. These were never seen by the Commission members, its staff, or even the autopsy surgeons before the report was finalized. The Commission said it would not 'press' for the X-rays and photographs because these would merely 'corroborate' the findings of the doctors, and that considerations of 'good taste' precluded these from being included.

"Well, you see, there was nothing that offended 'good taste' in the nine X-rays of Governor Connally's body [Commission Exhibit 691]; so this great curtain of secrecy that was pulled down on the X-rays and pictures of the President's body added more explosive fuel to the fire of doubt. There have been intimations that these X-rays and pictures had gone the way of Commander Humes' notes; and it was only after considerable public pressure built up that the pictures and X-rays were turned over to the National Archives by the Kennedy family in November of 1966; but they are still shrouded by this great curtain of secrecy. Secrecy is the natural culture medium for suspicion."

Why didn't the examination by the Navy doctors of the X-rays and pictures in November 1966 still the doubts of the critics?

"Let's come back to our analogy of the seven-year-old violin player. We sit him down in front of an electronic microscope and ask him what he sees on a slide. He says: 'I don't see anything.' We then jump to the conclusion that there is nothing there because an inexperienced eye can't see anything there."

What might these X-rays show to an experienced observer that could have been completely overlooked by the nonexpert expert?

"Who knows? Probably absolutely nothing. I don't like to engage in rank, blind speculation; so I can only explain how I would approach them. My first interest would be to see whether there could be another bullet or fragment of bullet in the body which has not been accounted for.

"Remember that the Warren Commission concluded that the preponderance of the evidence indicated that three shots altogether were fired. Only one relatively intact bullet and the fragments of a second bullet were found. This leaves a missing third bullet. I definitely do not agree with the Commission's

conclusion that only two bullets caused all the wounds suffered by both President Kennedy and Governor Connally; but we'll pass that for the moment.

"Since the X-rays of the President's body were not filed as exhibits, we must rely entirely upon the observations of the Navy doctors that they skillfully eliminated the possibility that a third bullet, or a fragment of some bullet, did not enter the body and somehow meander down to come to rest in some illogical, remote spot. Apparently, the doctors did not feel confident enough to rely on the X-rays during the autopsy when they went probing, or rather tried to go probing, for the bullet that was found on the stretcher in Parkland Hospital. They have now been quoted publicly as saying that they did have the X-rays available to them that night. Bullets do have a funny habit of showing up in the most astounding places in the body.

"I would also look for trace flecks of metal that might indicate another head wound. This possibility is extremely remote; but it still exists. Often, quite often, wounds of entrance in the head are completely overlooked because they are covered naturally by the hair. The wound may barely bleed at all. If you don't take a comb and go over the entire scalp inch by inch, separating the hair carefully and meticulously, it's easy to miss a head wound entirely. There is no evidence that this type of examination was made."

Would the X-rays help establish whether the two wounds in the neck area were wounds of entrance or of exit?

"No, I would not expect them to be of help on this question. An X-ray film is nothing more than a photographic record of the different densities of tissues through which the X-ray beam has passed. It will not record defects in the skin and soft tissue caused by a bullet passing through."

What about the black and white and the color photographs?

"These could be of considerable interest and value. A lot would depend on their quality and how they were exposed. Hopefully, they could shed considerable light on the neck wounds. I would, of course, be interested in what the pictures of the rear neck wound would show; but I would be particularly interested in seeing whether the pictures of the throat wound are good enough to permit it to be evaluated and possibly reconstructed."

Where else can the Warren Commission be faulted for what it did or failed to do?

"Again, it committed a grievous error of omission by failing to call in someone who knew something about bullet wounds in the body. This led them into the final trap of buying Assistant Counsel Arlen Specter's theory that the same bullet which passed through the President's neck was the bullet that also wounded Governor Connally, shattering his fifth rib, fracturing a bone in the wrist, and finally going on to slash his thigh. Now, this bizarre *path* is perfectly possible. When you are working with bullet wounds, you must begin with the premise that *anything* is possible; but Mr. Specter and the Commission overlooked two important ingredients.

"In the first place, the original, pristine weight of this bullet before it was fired was approximately 160-161 grains. The weight of the bullet recovered on the stretcher in Parkland Hospital (Commission Exhibit 399) was reported by the Commission at 158.6 grains. This bullet wasn't distorted in any way. I cannot accept the premise that this bullet thrashed around in all that bony tissue and lost only 1.4 to 2.4 grains of its original weight. I cannot believe either that this bullet is going to emerge miraculously unscathed, without any deformity, and with its lands and grooves intact.

"Secondly, Mr. Specter and the Commission have asked too much from this bullet. You must remember that next to bone, the skin offers the greatest resistance to a bullet in its course through the body than any other kind of tissue. The energy of the bullet is sometimes so spent that it can't quite get out through the final layer of skin, and it comes to rest just beneath the outside layer of skin. If it does get through the skin, it may not have enough energy to penetrate even an undershirt or a light cotton blouse. It has exhausted itself, and just more or less plops to a stop.

"This single bullet theory requires us to believe that this bullet went through seven layers of skin—tough, elastic, resistant skin. It passed through the back of the President's neck, then out through his throat; it entered the Governor's back and out through his chest; it next entered the skin on the back of his wrist; it came through the layer of skin on the inside of his wrist; and it apparently penetrated the layer of skin on his left thigh. In addition to these seven layers of tough human

skin, this bullet passed through other layers of soft tissue; and then these shattered bones!

"I just can't believe that this bullet had the force to do what Mr. Specter and the Commission have demanded of it; and I don't think they have really stopped to think out carefully what they have asked of this bullet for the simple reason that they still do not understand the resistant nature of human skin to bullets."

Do these conclusions shed any light on the order of the shots?

"In my opinion, this beautifully preserved bullet that was found in the Hospital was the first bullet that was fired. It passed through the President's neck, exited from the throat wound, and was stopped by his clothing, or just plopped out of his neck into his clothing. I've seen this exact thing happen hundreds of times."

What about the Commission's conclusions that this bullet was found on Governor Connally's stretcher in Parkland Hospital?

"It's based on tortured evidence, or inconclusive evidence, to say the least. No one will ever know for sure which stretcher this bullet came from. In my opinion, the probabilities are that it fell out of the President's clothing while the doctors were administering to him in the hospital. For the sake of argument, however, let's assume that it was found on the Governor's stretcher. This still does not rule out the premise that it was the first bullet that passed through the President's neck. That spent bullet could just as easily have taken an erratic jump out of the President's clothing and lodged in Governor Connally's clothing. These things happen with bullets. Sometimes they get through the final layer of skin and hop limply about it all arcs of the circle and at all angles to the wound of exit."

Do you agree with Governor Connally that he was struck by the *second* bullet?

"Yes, I definitely do. His testimony is most persuasive. I just can't buy this theory that this beautifully preserved first bullet is going to have power enough to pass all the way through the *seven* layers of skin of the two men, plus other soft tissue, plus rib and wrist bone, and end up losing no more than 2.4 grains of its weight. In my opinion, the second bullet that wounded Governor Connally is the one that is missing."

Shouldn't this bullet have been found during the careful search of the Presidential limousine?

"Not necessarily. It is not unusual at all for spent bullets

that have passed through a human body to become lost. Most longtime homicide detectives can spin off several tales of cases of lost bullets. If I had to venture a guess as to what happened to the bullet that wounded Governor Connally, I would suggest that it fell out of his pants leg while he was being removed from the car and placed on the stretcher; or it could have fallen out at any stage of his hospital experience."

And the third?

"The third one quite obviously is the one that caused the President's massive head wound, and his death. Also, either a fragment from this bullet, or a piece of skull, caused the cracking of the windshield and the dent in the windshield chrome on the interior of the limousine, provided these marks on the car were not already present at the time the shooting began."

Assistant Counsel Arlen Specter's creation of the theory that a "single bullet" passed through the President's neck and went on to inflict all of Governor Connally's wounds has been hailed by a prominent Commission staff member as the one significant contribution of the Warren Commission to the solution of the assassination. It was at odds with the FBI reports of December 9, 1963, and January 13, 1964. The FBI concluded: "... three shots rang out. Two bullets struck President Kennedy, and one wounded Governor Connally. . . ."

Mr. Specter thought that he needed the "one bullet" theory because of the Zapruder movie, and the "one bullet" theory is perhaps the most amateurish conclusion in the entire Commission Report. Regrettably, it permits the brand of "doubtful" to cloud the genuine, bona fide Commission findings.

Abraham Zapruder is now undoubtedly the most famous amateur movie photographer in all history. As he stood in Dealey Plaza aiming his home movie camera in an easterly direction, he caught and recorded the Presidential motorcade as it proceeded north on Houston Street, to make its turn west onto Elm Street. This innocent, famous home movie ended up by leading Mr. Specter and the Warren Commission into an unfortunate trap.

Even those who have purported to study the work of the Commission in considered hindsight are still mesmerized by the beguiling and misleading power of the Zapruder movie. For example, in its November 25, 1966 issue, *Life* magazine innocently perpetuates the error. Its article reads: "Of all the witnesses to the tragedy, the only unimpeachable one is the 8-mm. movie camera of Abraham Zapruder, which recorded the assas-

sination in sequence. Film passed through the camera at 18.3 frames a second, a little more than a 20th of a second (.055 seconds) for each frame. By studying individual frames one can see what happened at every instant and measure precisely the interval between events."

The error that trapped the Warren Commission as well as *Life* magazine is that there is nothing at all *precisely* measured by the Zapruder film.

The nearest thing to a *precise*, objective event which the film records is at Frame 313, which shows the President's skull exploding as a result of the bullet that passed through his head. Every other item purportedly measured by the Zapruder film is *imprecise* because it must be evaluated and speculated upon through factors and calculations which involve unknown quantities.

One of the most common pitfalls in any investigation is the "timetable trap." The investigator becomes mesmerized by either a clock or a calendar and ends up with a conclusion that two and two are five, or that some Florida oranges are red because Washington Delicious apples are also red. This is exactly what happened to Mr. Specter who, unfortunately, was able to sell his erroneous theory to the Warren Commission.

Some time after the investigation into the President's death began, the FBI staged a mock reenactment of the assassination, which was geared to and scripted by the Zapruder movie. An FBI agent was stationed in the sixth-floor window of the Texas School Book Depository Building with a camera geared to the telescopic lens of the Mannlicher-Carcano rifle found at this same window minutes after the assassination. An effort was made to *synchronize* the Zapruder movie with what the assassin presumably saw from his point of vantage at the sixth-floor window as the Presidential caravan moved along its historic route.

It had previously been determined that the Zapruder camera ran at the speed of 18.3 pictures or frames per second. The timing of certain events, therefore, could be calculated by allowing 1/18.3 seconds for the action depicted from one frame to the next. Other tests had also determined that this Mannlicher-Carcano rifle required a minimum of 2.3 seconds between each shot fired.

Each frame of the Zapruder film was given a number, Num-

ber 1 beginning where the motorcycles leading the motorcade came into view on Houston Street. Combining the FBI reenactment with the Zapruder movie, it was concluded that the assassin had a clear view of the President from his sixth-floor window as the limousine moved up Houston Street, and for an additional one hundred feet as the Presidential car proceeded west on Elm Street. At a point denoted as Frame 166 on the Zapruder film, the assassin's view of the President became obstructed by the foliage of a large oak tree.† The President's back reappeared into view through the telescopic lens on the rifle for a fleeting instant at Frame 186. This momentary view was permitted by an opening in the leaves of the tree; but they closed to again obscure the view of the President's back through the telescopic sight until the car emerged from behind the tree at Frame 210.

The Commission implies that one of the difficulties in interpreting the Zapruder film is that the President's car begins to disappear behind a road sign reading "Stemmons Freeway Right Lane" at approximately Frame 193. At Frame 206, the President's hand is still raised as he disappears behind the street sign. He reappears in the film at Frame 225. As a matter of fact, it is really not essential to the evidential value of the film whether the President was or was not out of sight for some 30 to 32 frames.

There are those who viewed the Zapruder movie who *thought* that the President *looked like* he was hit through the neck when he reappeared from behind the street sign at Frame 225. They *think* that Governor Connally appeared to be hit at Frame 230. Governor Connally *believes* that he was hit around Frame 234. *Life* magazine summarizes the *subjective* factor of interpretation by saying: "Specter sees Connally wincing in Frame 230. *Life's* photo interpreters think he looks unharmed, as does Connally himself."

Still, Mr. Specter labored under the illusion that the Zapruder movie gave him a stopwatch precision measurement of

† One of the most incredible statements of the entire report appears on page 97: "On May 24, 1964, agents of the FBI and Secret Service conducted a series of tests to determine as precisely as possible what happened on November 22 1963. . . . The agents ascertained that the foliage of an oak tree that came between the gunman and his target along the motorcade route on Elm Street was approximately the same as on the day of the assassination."

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events that took place *not in the Presidential limousine but in the Texas School Book Depository Building over one hundred feet back up Elm Street.*

Mr. Specter did not believe that he could solve the problem of orienting the Zapruder movie to the minimum time required to fire two shots from the Mannlicher-Carcano rifle without adopting the "one bullet" theory. The 2.3 seconds required to fire two shots from the rifle worked out to 42.09 frames of the Zapruder movie. Even assuming that the President had been hit in the neck while he was behind the street sign at, say, Frame 210, it would not be possible for a second shot to be fired until Frame 252.09.

This presented a difficult impasse, provided the "timetable" supplied by the Zapruder movie was correct. Mr. Specter assumed that this "timetable" was accurate, and then adopted the "one bullet" theory to get around its limitations. Otherwise, he was faced with the awkward admission that *two* guns were used instead of one.

His better procedure would have been to carefully analyze his "timetable" in an effort to understand exactly what he was working with. By beginning with Frame 313, the only objective point of reference in the entire film where the picture of the President's exploding skull was recorded, it is possible to set up a *reverse timetable by working backward*:

Frame	Description of Event	(Seconds)	
		Elapsed Frames	Elapsed Time
313	President's skull explodes	—	—
230	Governor Connally's "reaction" (earliest estimate)	83	4.5
210	President possibly hit while behind street sign	103	5.6
186	<u>Momentary</u> reappearance of President through leaves of oak tree	127	6.9
166	Disappearance of President from assassin's view caused by foliage of oak tree	147	8.0

What does this *reverse timetable* prove? It proves exactly the same thing as the *forward timetable* of the Zapruder film, which

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is exactly nothing. Nothing is proved because we do not know when the President and Governor Connally were struck by the first and second bullets. There is absolutely nothing in the frames of the movie to give us any precise measurement. In the first place, we are in a quandary of uncertainty as to when the President and the Governor "reacted" to their respective wounds. It has already been clearly established that different observers of the Zapruder film have reached different opinions as to when these "reactions" took place. We are dealing with *subjective* evaluation which completely kicks out the concept of any *precise* "timetable."

The next great error that was committed in attempting to use the Zapruder film as a "timetable" was the assumption that the President and the Governor would have some visible reaction to their wounds at almost the *exact instant* that the wounds were sustained. There is absolutely nothing in medicine to indicate that this assumption is correct. As a matter of fact, what is known about reaction-time generally indicates that the assumption may *not* be correct.

It must readily be admitted that the reaction-time of any person to a bullet wound is a purely speculative entity. No one has yet conducted a series of experiments so that a set of rules governing reaction-time to bullet wounds can be formulated.

Studies have been made of certain other types of reaction-time in the field of automobile accident reconstruction where elaborate tests have been given to drivers under controlled conditions. It has been established that between the time the driver perceives a dangerous event and the time that he applies his brakes or begins other evasive action, an average reaction period of two-thirds to three-quarters of a second elapses. In some individuals, this reaction-time is well over one full second. There is always some "drag" or reaction-time involved between the stimulus and the reaction to the stimulus. This is true, even though this type of stimulus is something that the driver has been conditioned to expect and which he must anticipate by the nature of the testing situation.

No one knows whether there is an analogy between driver reaction-time and bullet wound reaction-time. It can be argued plausibly that driver reaction-time involves a conscious thinking process, whereas the reaction of the body to a bullet is more nearly analogous to an autonomic, reflex type of action. There are, however, hundreds of reported cases in which the person

shot apparently does not realize that he has been shot for a period of several minutes. He may continue to perform a number of complex, highly coordinated functions for a substantial period of time before collapsing to lose consciousness or to die.

Furthermore, Governor Connally's reaction-time to his wounds may have been more rapid than the President's reaction-time to his first neck wound. This is true because the Governor's wounds were far more severe than the President's neck wound. The Governor may have been hit at Frame 230 of the Zapruder film. He may have "reacted" immediately, so that his "reaction" can still be observed by viewers of the movie. This does not mean at all that the President could *not* have been shot through the neck *before* Frame 166 when his back disappeared behind the leaves of the oak tree, or at Frame 186 when his back reappeared momentarily, and the President's observable physical reactions appeared in the movie only *after* Frame 225 when the President emerges from behind the road sign.

There is absolutely nothing in the "open end" Zapruder movie "timetable" to rule out the possibility or even the probability that the President was shot through the neck before Frame 166. The error in using the Zapruder film was in the assumption that the President would have to "react" instantaneously to the neck wound in such a manner that his reaction could be observed in the movie. The Zapruder film is not really a "timetable" after all, because it can help establish the "location" of only one "station" along the "railroad." It does not help us pinpoint the other two important stations, nor does it tell us when the train got there. We can use the Zapruder "timetable" to conclude that the train got to one station *probably* no later than Frame 225. It reached the second station no later than Frame 234. We cannot tell from the Zapruder film what the train was doing before these two locations, or even where our "floating" stations one and two are located.

It was not necessary for Mr. Specter to devise, nor for the Commission to buy, the "one bullet" theory to eliminate the necessity of adopting the embarrassing premise that *two* rifles were used to do the shooting instead of one.

Dr. Helpern's theory of three separate bullets causing three separate wounds, two in the President's body and one in Governor Connally, is not at all inconsistent with the Zapruder movie

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when the movie is properly interpreted as being nothing more than an open-end, one-station timetable where the separate and distinct elements of time, distance, and location have been confused.

Mr. Specter also failed to reckon with a creature called chance, or fate, or luck and to consider the possibility that the assassin may have fired a first shot blindly, without taking careful aim. Dr. Helpern recalls the case of a spectator who suddenly plunged forward out of his seat at the Polo Grounds while watching a baseball game. He was dead from a .45 caliber bullet hole through the middle of his forehead. Police subsequently traced the firing location to the roof of a house several blocks away, where a man, without intent or purpose, had pointed the gun into the air and pulled the trigger. The least likely result that he could have anticipated was the death of an innocent baseball fan.

What about the "wound ballistics experiments" conducted at the Edgewood Arsenal?

"Well," Dr. Helpern responds, shaking his head in disbelief, "the mere fact that they felt constrained to perform these tests in the first place shows a total lack of knowledge on the subject of bullet wounds in the body. They went down there and tried to rig up dummies that would simulate the President's head and neck area. They took human skulls, filled them with gelatin, and covered them with goatskin and hair. They rigged up a dummy with gelatin and animal meat to simulate the neck area of his body. Then they got a goat to simulate Governor Connally's body. They took the rifle found in the Texas School Book Depository Building and began firing into these dummies. All they proved was that they proved absolutely nothing. One of the experts was utterly surprised that a bullet could cause the massive wound in the President's head. His surprise alone clearly indicates his limited experience.

"We have all kinds of cases in our files that show what bullets can and have done in the human body. So does everyone else who is active in the field of forensic medicine. For example, Dr. LeMoyne Snyder has a case that almost duplicates the President's head wounds in every respect. It arose out of a bank holdup in Michigan. A dentist who had his office on the second floor of a building directly across the street from the bank went to the window to see what the trouble was. He saw one of the bandits running down the street with people yelling after him.

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The dentist was quite a deer hunter and kept a rifle in his office. He reached for his rifle, raised the window, and hit the bandit in the back of the head with a single shot. By that time, the bandit was just about the same distance away as the Presidential limousine was from the sixth-floor window of the Texas School Book Depository Building when the third shot struck. The head wounds this bank bandit sustained were almost identical in every respect to those of President Kennedy.

"Nevertheless, the Commission chose to rely on the synthetic tests at the Edgewood Arsenal to support its conclusion that a single bullet probably caused the wound through the President's neck and all of Governor Connally's wounds. This was done even though one of the three experts, Dr. Light, testified that the anatomical findings alone were insufficient for him to 'formulate a firm opinion on whether the same bullet did or did not pass through the President's neck wound first before inflicting all the wounds on Governor Connally.'"

Is there anything in the overall picture to cast serious doubt on the principal conclusions reached by the Warren Commission?

"Of course, I haven't seen the pictures and the X-rays of the President, but on the basis of the evidence that has been made public, the Commission reached the correct opinion that all three bullets were fired by one rifleman from the sixth-floor window of the Texas School Book Depository Building. The unfortunate autopsy and other procedures have merely opened the door and invited the critics to enjoy a full-blown Roman holiday at the expense of the dignity and prestige of the country as a whole.

"The fact that a rigorous cross-examination of the three autopsy surgeons would have ripped their testimony to shreds does not necessarily mean that their conclusions were *totally* wrong. The fact that the Commission may have erred in concluding that the same bullet that struck the President also wounded Governor Connally does not mean that the Commission was *totally* wrong in its opinion that all the shots came from the Depository Building. What it means is that the Commission members themselves set the stage for the aura of doubt and suspicion that has enveloped their work."

The Commission, of course, was an unusual creature. It was itself a synthetic entity. It was extrajudicial, extraexecutive, and extralegislative. It was supposed to be a public forum for taking

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evidence because the normal forum of the courtroom was wiped out when Jack Ruby killed Oswald. If Oswald had lived, all the evidence about the President's death could have been aired in the courtroom and all the witnesses would have been open to cross-examination. In its procedures, the Commission failed to supply anything that would fill the disastrous void left when the right or motive to cross-examine the witnesses was wiped out. They did not provide for the essential 'Devil's Advocate.'

The biblical saying that "a man is judged by his work" may be appropriate. The Commission's work opened the door and invited the critics to flood in.

Is there anything specifically that Dr. Helpern would like to see done at this point?

"It may well be too late to do anything, since the primary evidence is gone. There is a possibility, however, that the X-rays and photographs of the President's wounds might contain some clarifying information. I would certainly feel more comfortable about the Warren Commission's findings if a group of experienced men, who have had a great deal of practical work in bullet wound cases, could take a look at these X-rays and pictures. I have in mind men like Dr. LeMoyne Snyder, author of *Homicide Investigation*, Dr. Russell Fisher, the medical examiner for the State of Maryland, Dr. Frank Cleveland in Cincinnati, and Dr. Richard Myers in Los Angeles. These men are all members of the American Academy of Forensic Sciences. These pictures and X-rays *might*, and I emphasize *might*, settle the questions raised by the critics once and for all.

"The tragic thing is that a greatly loved President was not given the same type of expert medical attention and medical respect in death that he received in life. When he was having his back problems, he properly consulted the leading experts in the field of orthopedic surgery; but, you see, in death, the task of evaluating his bullet wounds was not given to experienced experts in this field. It was still the old saw that an autopsy is an autopsy, and anyone can do it, particularly as long as he is a general or 'hospital' pathologist."

What about the portions of the autopsy protocol that have not been released to the public?

"These, I think," Dr. Helpern answers, "are personal matters that should be left entirely to the family, although I do think that the public is entitled to the most expert and definitive determination possible on the bullet wounds that caused death."

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It has been argued that since the question of whether the President did or did not have Addison's disease was injected as an issue into the 1960 Presidential campaign, the public is entitled to know whether there were any findings at autopsy that tended to substantiate this allegation.

Some of Dr. Helpern's colleagues also argue that if the autopsy findings did show a deterioration of the adrenal glands, which would be evidence of Addison's disease, it is a missed opportunity for showing the progress of medicine in general to fail to disclose it. A person suffering from Addison's disease can now be placed on medication so that the disease can be controlled in much the same manner that diabetes is controlled by insulin. This, of course, was not true a generation ago. These doctors continue that it would dramatically show medicine's progress if a man with Addison's disease could be treated so successfully that he could function well enough to perform the duties demanded by the office of President of the United States.

"I still go along with the feeling," Dr. Helpern concludes, "that any disclosure in the autopsy findings over and above the bullet wounds which produced the President's death must be considered a private matter for the family to do with as they personally desire."

It is not difficult to understand the bewilderment of the Europeans as they attempt to evaluate the medico-legal features of the Kennedy autopsy and the Warren Commission report. Respected chairs in forensic medicine have been held by outstanding professors in all the European universities for many generations. It is a well-established medical specialty.

If President Kennedy had been assassinated in a European country, the Minister of Justice would have immediately designated the leading professor of forensic medicine in the country to perform the autopsy. He would have been assisted by three or four heads of medico-legal institutes. Men experienced in evaluating bullet wounds *at the autopsy table* would have appraised the head and neck wounds. The wounds of entry and of exit would have been clearly identified and labeled. There would have been nothing left over for the critics to chew on.

In private conversations, Dr. Helpern seriously wonders just how much progress has been made in acquainting the public with the needs and possibilities of forensic medicine since that day he traveled down to western New Jersey to testify in the

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Edoardo Bonifacio case over a quarter of a century ago.

The Bonifacio case had an interesting personal sequel for Dr. Helpern which he enjoys relating.

The years passed by after Bonifacio's acquittal. World War II came and went. Names by the hundreds, and then the thousands, clouded Dr. Helpern's memory.

He was on his way to work one morning when he opened *The New York Times*. A four-column picture in the middle of the front page caught his eye. In it, a man and a woman were embracing. He immediately recognized the face of the woman with its friendly expression, the warm eyes, and the beautiful white hair. It was the mother of the young defense attorney in western New Jersey who had been so proud of her son, and who had graciously served as Dr. Helpern's hostess.

There was something slightly familiar about the man's face as well, but Dr. Helpern could not immediately identify him. He hurriedly turned to the caption under the picture. The man was attorney Robert Meyner, just elected governor of the State of New Jersey, and later a leading contender for the Democratic nomination for the office of President of the United States.